1444 Issued June 1, 1912.

U. S. DEPARTMENT OF AGRICULTURE.

FARMERS' BULLETIN 499.

Experiment Station Work, LXIX.

Compiled from the Publications of the Agricultural Experiment Stations.

TOP-DRESSING PASTURES.
MAKING HAY.
A FRESH-AIR BROODER.
ROOSTING CLOSET FOR POULTRY.
EXHIBITION CONTESTS OF DAIRY PRODUCTS.
BLIND STAGGERS OF HORSES.
ADOBE AS A BUILDING MATERIAL.
WHITE AND COLOR WASHES.

MARCH, 1912.

PREPARED IN THE OFFICE OF EXPERIMENT STATIONS.
A. C. TRUE, Director.

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1912.

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EXPERIMENT STATION WORK.

Edited by W. H. Beal and the Staff of Experiment Station Record.

Experiment Station Work is a subseries of brief popular bulletins compiled from the published reports of the agricultural experiment stations and kindred institutions in this and other countries. The chief object of these publications is to disseminate throughout the country information regarding experiments at the different experiment stations, and thus to acquaint farmers in a general way with the progress of agricultural investigation on its practical side. The results herein reported should for the most part be regarded as tentative and suggestive rather than conclusive. Further experiments may modify them, and experience alone can show how far they will be useful in actual practice. The work of the stations must not be depended upon to produce "rules for farming." How to apply the results of experiments to his own conditions will ever remain the problem of the individual farmer.—A. C. True, Director, Office of Experiment Stations.

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EXPERIMENT STATION WORK.[1]

TOP-DRESSING PASTURES.[2]

That certain kinds of run-down pastures may be successfully restored by a proper system of top-dressing has been clearly shown by experiments made by W. P. Brooks at the Massachusetts Experiment Station on one of the typical pastures of the region, a large proportion of which is stated to be producing relatively little feed. In the early spring of 1909, 500 pounds of basic slag and 300 pounds of low-grade sulphate of potash (mixed together just before using) was applied per acre to this pasture.

Before the end of the first season there was a marked difference in the character of the growth upon the fertilized and unfertilized plats. On the former, white clover was found to be coming in, while the grasses showed a much greener color and more vigorous growth.

The pasture in which these plats lay was heavily stocked with milch cows throughout the summer, and it was observed that they grazed upon the top-dressed plats a much larger proportion of the time than on the other portions of the pasture.

In the spring of 1910 the application was repeated, with the result that the effect of the fertilizing was still more marked than in the previous season. As a consequence of the improvement in the character of the forage produced on the top-dressed land, this portion of the pasture was more closely grazed than is considered favorable for the best development. Nevertheless, the improvement in the character of the herbage was very striking, and it is estimated that the top-dressed area produced fully three times the amount of feed yielded by the untreated pasture. It is pointed out that not all pastures can be top-dressed successfully, but in many other cases top-dressing is the only practicable method of improvement.

It is not believed it will be found profitable except in those cases where the turf is mostly free from foreign growths, such as shrubs, bushes, hardhack (spirea), and ferns. If any considerable proportion of the area is occupied by such foreign growths, the first step in improvement should be their removal. * * * When cleared of foreign vegetation a pasture may, in many cases with advantage, be harrowed and seeded if the surface is much broken as the result; but if the obstructions have been widely scattered, it may be advisable simply to level the areas dug up in connection with the removal of the foreign vegetation and to seed those areas only. Kentucky bluegrass and white clover will be more useful than any other varieties. * * * After the surface has thus been cleared such pastures, as well as those which are now clear, may be expected to repay judicious top-dressing.

[1] A progress record of experimental inquiries published without assumption of responsibility by the department for the correctness of the facts and conclusions reported by the stations.

[2] Compiled from Massachusetts Sta. Rpt. 1910, pt. 2, p. 18.

It may be here pointed out that improvement of our pastures will not only increase the amount of stock which a farmer can keep, but it will be likely to increase the milk yield of a given number of cows, since in improved pastures the animals will be able to gather sufficient food in a much smaller number of hours, and will have leisure to ruminate, and to convert a larger portion of the feed consumed into milk.

In pastures in which the surface is occupied in considerable measure by rocks, top-dressing is of course likely to prove less profitable than in those which are free from such obstructions. It will be apparent, further, that the more nearly level the pasture the less probability that the materials used in top-dressing will be washed away.

It is believed that the basic slag meal used in the experiments referred to is peculiarly suited to meet the requirements of a large proportion of our pasture soils. Especially must this be true of those naturally poor in lime, with soils which are retentive of moisture, and where white clover is scantily produced. Slag meal is likely to produce less striking effects in pastures which now produce white clover abundantly, or in those having excessively dry soils. Its special fitness for the improvement of pastures deficient in lime and not now producing white clover is undoubtedly connected with the fact that it is rich in lime. Its tendency, therefore, is to sweeten soils which are naturally sour, and thus to bring them into such condition that clovers can thrive. It is now generally understood that clovers can not flourish in soils containing free acid. Basic slag meal, moreover, is a relatively low-priced fertilizer, and it may be pointed out still further that it has for many years been profitably used for top-dressing pastures in various parts of Europe, especially in England.

It has been found that on soils of the character of those used in these experiments a liberal application of potash is required in order to bring in a vigorous growth of clover, and under the climatic conditions prevailing a good, permanent pasture without white clover is considered a practical impossibility. Low-grade sulphate of potash was used in these experiments because it had seemed in other experiments to be especially favorable to the growth of white clover, but muriate and high-grade sulphate of potash produce like results and cost rather less in proportion to the actual amount of potash supplied than the low-grade sulphate, "and in localities where transportation counts as an especially important item they should perhaps be preferred, since to obtain an equal amount of potash it would be necessary to use them in only half the quantities required of the low-grade sulphate."

In regard to the best season for top-dressing, Prof. Brooks is of the opinion that for local pastures "top-dressing with a mixture of slag meal and potash salt had best be done in the autumn, but in all cases where the slopes are excessive it will be preferable to apply the materials in the early spring."

MAKING HAY.[1]

As A. M. Ten Eyck, of the Kansas station, points out, farmers can well afford to give more attention to the matter of quality in hay, and to this end it is important to know not only what hay plants are best adapted to a given locality and the best method of seeding

[1] Compiled from Kansas Sta. Buls. 155, 175.

them, but it is equally important to harvest and save the hay in such a manner as to secure the largest amount and best quality of produet. "Good quality, as indicated by the bright-green color of well-preserved hay, will readily add a dollar or two per ton to the selling price."

CUTTING THE HAY.

Tbe common hay grasses and legumes differ somewhat in the stage of maturity at which each should he cut to make the best quality of hay, and farmers and feeders are learning that this difference in quality means not only a difference in markot value but also a difference in feeding value. The stage of maturity at which grass should be harvested, in order to make hay of the best quality, varies somewhat with the different grasses and the use to which the hay is put. A safe rule applicahle to all common grasses is to cut the grass just as it is beginning to bloom or just after the bloom has fallen. For cattle and sheep, hay from the early cutting is best, but for horses the later cutting is preferahle. When cut in the early stage, grass is sure to make good, clean hay of prime quality, if the hay is cured well. Often a larger weigbt may be secured by cutting the grass after it becomes more mature, but the quality of the hay is not apt to be so good. If grass is cut when in full bloom the hay is sure to be more or less dusty. The over-mature hay is less palatablo to stock and its feeding value per hundred pounds is usually less than the value of that cut at an early stage of maturity. * * * Timothy should be cut just as it is coming into bloom. When timothy is grown in combination with common red clover, it is necessary to cut the crop early in order to secure the clover before it has become too ripe to make good bay. The hay cut at this stage is best for feeding cattle and sbeep. Timothy should not be allowed to stand until in full bleom, since, if cut at this stage, the hay will be dusty and especially objectionahle for feeding horses.

Te make the best hay for horses, timothy should be cut at the stage called "second bloom," which is really just when the grass has about ceased blooming and most of the blossoms have fallen. When timothy is cut at this stage, the greatest weight of hay is secured, and probahly the greatest amount of nutrients, but the hay is more woody and less palatahle than timothy cut earlier. * * *

Orchard grass, western rye-grass, perennial rye-grass, English blue grass, and Johnson grass quickly lose in palatahility when nearing maturity, and should be cut for hay before the blooming stage. Otber grasses, such as *Bromus inermis*, redtop, and tall oat-grass, retain their good qualities longer and make good hay if cut when in full bloom or after the blessoming stage. The annual cereal grains, such as barley, oats, and emmer, sowed sorghum, and Kafir, make the best hay if cut when the grain is in the milk or at the soft-dough stage. It is best to cut millet for hay as soon as it is fully headed, before the bloom forms. Cut at this stage, the hay is certainly less woody and more palatable than is the bay made from tho more mature millet. The poisonous principle in millet which causes it to he injurious to stock, especially to horses, does not seem to depend upon the condition of the millet with regard to its maturity and the time of cutting. While the less mature millet is better relished, it may seem to give injurious results more quickly. * * *

Clever should be cut just when it is in full bloom, with a few of the blossoms turning brown. If it is cut before this stage, the bay will be lighter and more "washy," especially if fed to horses; while if the crop is left until the clover is mature, many of the leaves will be shattered or lost in harvesting. This will be a great loss, for tbe leaves are the most nutritious part of the clever, as they contain nearly two-thirds of the pretein in the plant. * * *

Alfalfa should be cut for hay when it begins to bloom. Several experiments conducted at the Kansas Experiment Station and at other State experiment stations have shown that alfalfa hay has a higher feeding value when cut at an early stage of maturity,

about one-tenth in bloom, than when cut in full bloom. It has also been observed that when cut at the beginning of the blooming period the next crop, under favorable soil and weather conditions, starts quickly and there is no delay in the growth of the alfalfa. * * *

The leaves of the alfalfa are much richer in protein than the stems, and the leaves drop off and shatter worse in cutting if the plants are allowed to become too mature before harvesting. For feeding horses, however, it is advisable and often recommended to allow the alfalfa to become more mature and to reach full bloom before cutting. The more mature hay may be fed to horses with less danger of injurious effects, which sometimes occur from feeding the immature hay. * * *

Cowpeas should be cut for hay when the first pods are beginning to turn yellow. Soy beans must not be left so long, but are ready to cut for hay as soon as the pods are well filled. If they are left until too mature, the leaves drop or shatter in harvesting, thus decreasing the palatability and the feeding value of the hay. Field peas and vetches make hay of good quality if cut when the pods are almost fully formed and some of the seed is beginning to ripen.

CURING THE HAY.

The most important factor in making good hay is favorable weather. Hay exposed to excessive rains is greatly injured in quality and in feeding value. This is especially true of hay from leguminous plants, such as clover and alfalfa. Every farmer knows that hay is injured by rain and dew, which cause it to bleach and to mold, and which take from it the natural aroma and palatability essential in hay of good quality. Not all are aware, however, that hay which is cured too much in the sun not only bleaches and loses leaves by becoming too dry but also becomes lighter in weight and less palatable. .

When one cures hay of any kind, he should aim to expose it to the sun no more than is absolutely necessary. The best hay is therefore made by curing it largely in cocks rather than by leaving it spread over the ground in the swath or windrow. Hay in the swath and windrow is also more exposed to injury by rain and dew than is hay in the cock. Rain not only bleaches hay, thus lowering its market value, but the feeding value of the hay may also be very much decreased.

Hay cures more evenly in the cock than in the swath or the windrow. If left too long in the swath, the leaves become thoroughly dry, while the stems still retain a large amount of moisture. Such hay will not cure fully and evenly and is often put into the stack in a partly cured condition. If hay is raked before the leaves are dry and placed in cocks, the leaves continue to draw moisture out of the stems, thus allowing the hay to cure evenly.

Clover or alfalfa hay well cured in the cock in this way will keep perfectly in the stack or in the mow. When cured in the swath and windrow, the hay is often stacked in such condition that it may burn or spoil in the stack. Also, the greater breaking of the leaves which must take place in curing alfalfa or clover in the swath and windrow, makes the hay less palatable to stock, and less nutritious than hay which has been properly cured.

A large part of the hay made in the United States, however, is cured in the swath and windrow, or in shocks made up by bunching the hay with the horserake. When a farmer has a large amount of hay to put up and little help with which to handle it, he is compelled to do the work in the most rapid and economical way. Putting up the hay directly from the windrow is not only a saving of labor, but it enables the haymaker to do the work rapidly so that the danger of loss by exposure to the weather is lessened.

In the Central States it is common to cure timothy and clover hay in the swath and windrow, and to put it on the wagon by means of the hay loader, which makes the work more rapid and does away with the hard labor of pitching. In the large

alfalfa and prairie-grass fields of the Western States, the common method is to use sweep rakes, by which the hay is taken directly from the windrow to the stacker. Where a large amount of hay is made, it is almost necessary to handle the crop by such a method. The method of curing hay in cocks is more applicable to the small farmer and to farmers who live where the market price of hay makes it profitable to handle it in this more expensive way.

The following general suggestions may be given with reference to making clover or alfalfa hay: As soon as the dew is off in the morning, start the mower; when the hay has wilted somewhat, run it over with a tedder if the crop is heavy and needs lifting; after an interval of a few hours, before the leaves have begun to get dry and brittle, rake the hay into windrows. Allow the hay to remain in this condition for a day or two, when it may be put into the stack or mow. If the plan of curing in cocks is followed, the hay should be placed in small cocks soon after raking. It will be necessary for it to remain in the field for from one to three days of drying weather before it is ready to be put into the stack.

It is possible to start the mower late in the afternoon, cutting until dark, raking the hay the next forenoon, and bunching or cocking as described above. Good hay may be made in this way, since the dew does not blacken the green hay, and even a light rain during the night may not greatly damage it. There is some objection to this method, however, for making clover or alfalfa hay, in that the dew falling on the green hay in the swath seems to favor the development of white mold. Cutting only during the forenoon after the dew is off is perhaps the preferable method, provided the farmer can handle the crop rapidly enough in this way.

Hay is much more likely to be injured by the moisture on it than by the moisture in it. This should be an invariable rule: Hay should not be raked or bunched or placed in the stack or mow when there is moisture on it either from dew or from rain. Such hay is likely to mold in the cock or in the mow and is almost certain to heat, to blacken, or to "burn" in the stack.

Grasses cure much more quickly than do alfalfa and clover. The length of time required for curing grass hay will depend upon the kind of grass, upon the degree of maturity, and upon the weather conditions. In good weather most grass hays may be cut one day and stored the next. It is even possible to cut grass in the forenoon and to put it up in the afternoon.

Because hay requires rapid handling, it is not necessary to cure grass hay in the cock in good weather. In showery weather, however, it is a very good plan to rake the hay somewhat green, to cock it, and to allow it to cure. Grass hay will shed rain much better in the cock than will clover or alfalfa.

STORING THE HAY.

Hay should be stored in sheds or in barns. Grass hay sheds the rain better than does clover or alfalfa, and may be stored out of doors with little loss, provided the stacks are well made and covered. However, a good hay shed is a profitable investment on any farm. When hay is fed on the farm, the aim should be to store it in a convenient place, so that it may be conveyed to the stock with the least amount of labor. If possible, the hay should be stored, and the live stock fed, under the same roof. This will avoid the expense of handling the hay a second time and the loss from the breaking of the leaves and heads.

The most rapid way of putting up hay is by the use of sweep rakes and sweep stackers, or swinging stackers. This necessitates stacking the hay in the field where it is cut. This method of putting up hay is best adapted to those regions where hay is made on a large scale. On the average farm, the practical method is to load the hay on wagons and to haul it to the stack or mow. The hay is rapidly removed from the load and dumped into the mow or stack by means of the hayfork or the hay sling. Slings are often preferable to hayforks for unloading hay, on account of the cleaner and more rapid work which may be done by the use of the sling. For barn or shed

storing, a carrier and track is usually most convenient. For field stacking, some form of hay poles with the pulley and rope, either with or without the track, is in general use.

Hay should not be stacked on the ground, but on an elevated bottom made of poles and brush. If hay is green or unevenly cured, it is apt to "burn" or spoil when there is no ventilation beneath the stack. Great care should be taken to keep the middle of the stack full, so that when the hay settles the stack will shed rain. There is no better grass covering for stacks than marsh hay. When the stack is finished and topped out, one should not fail to bind on the cover with good hangers of wire attached to stones or heavy sticks of wood. As a rule, canvas or board stack covers are troublesome and expensive and not to be recommended. A farmer might better build a good hay shed than use such temporary means of protecting the stacks from rain. It is often advisable to have a canvas cover or two for temporary use when hay is stacked out of doors. * * *

Although the methods described above are the safest and the most satisfactory, it is a very common practice to put clover hay into the mow in a partially cured condition, perhaps on the afternoon of the same day the hay is cut. Green or partly cured clover put into a tight barn will become very hot, but it will not "burn." Such hay may come out in good condition for feeding, but with a brown color which injures the hay for selling on the market. It may be practicable also to store clover while green in raised-bottomed sheds, according to the plan which is now being used in this State for storing green alfalfa. It is now becoming a common practice in the more humid sections, where the method of farming is intensive rather than extensive, to protect the hay in the field by covering the cocks with canvas or with paper caps. There is little question regarding the practicability and economy of such a practice on small farms, and there is little question also but that the same method may be used profitably when alfalfa and clover are put up on a large scale. The canvas covers are doubtless to be preferred, since they are more durable and are more easily handled than are the paper caps. * * *

It is a common practice in the Middle and Eastern States to salt the hay when it is put into the stack or mow. In Kansas this practice is not usually followed except by certain farmers who stack alfalfa hay in a green or partially cured condition, and apply salt or lime for the purpose, as they claim, of preventing the hay from heating. There seem to be no sufficient data to prove that the application of lime or salt prevents hay from heating. No work along this line has been reported by experiment stations, and the reports of farmers vary. If the application of salt or lime prevents the heating of green or partially cured hay, this power is probably due to the influence which the salt or lime has in checking the growth of microbes or fungi which cause the fermentation that develops heat. In the same way, lime or salt may prevent the molding of hay.

There is little question but that the salted hay is relished better by stock. The fact that cattle eat the hay with greater relish may be the cause for the opinion among farmers that salting preserves the hay or makes it keep better. The application of a small amount of salt to the new hay in stacking may be recommended even when hay is well cured. The application of from 2 to 4 quarts of salt per ton is usually sufficient, but if the hay is green or only partially cured, more salt may be used. As far as the writer knows, there is no advantage in using lime to prevent the heating of hay, and salt should be preferred, since it adds palatability to the hay. So far as known, no injurious effects result from feeding the limed hay.

A FRESH-AIR BROODER.[1]

It is a general experience that loss of chicks during the early period of their life in brooders is apt to be large despite the utmost care and attention. The mortality of brooder chicks has therefore been the

[1] Compiled from Maine Sta. Bul. 199.

subject of considerable investigation by the experiment stations. Raymond Pearl, of the Maine station, has come to the conclusion that the trouble is in part at least due to fundamental defects in the ordinary type of bottom-heat hot-air brooder commonly used, viz, (1) too much floor heat, (2) poor ventilation, and (3) inconvenience, expense, and wear and tear of moving the brooders about when they

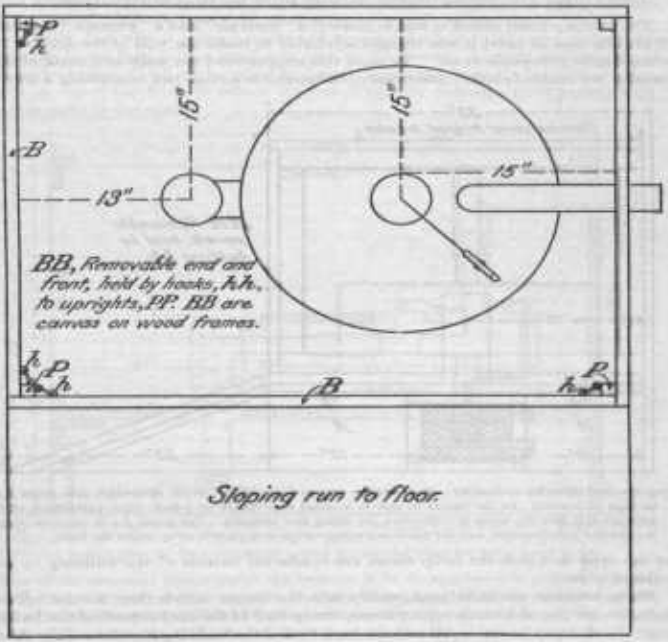

FIG. 1.—Floor plan of fresh-air brooder.

"are operated in small colony houses, and the same houses are used for growing the chickens on the range throughout the summer."

As a result of comparative tests of different makes of brooders, a brooder was designed which it is believed has decided advantages over ordinary types. The advantages claimed are "that it is possible to rear in this brooder a larger number of chicks in proportion to the number originally put in than in any other brooder with which

the station has had any experience." The mortality is not only relatively low, but the chicks are healthier and thriftier. "The second advantage lies in the great saving of labor which is effected by the use of the new brooder. The fact that the brooder never has to be removed from the house where it is operated means a decided economy."

Describing the construction of this brooder it is stated that—

The primary point aimed at was to make it a "fresh-air" and a "pure-air" brooder. With this idea in mind it was thought advisable to make the wall of the brooder in some degree permeable to air. To meet this requirement the walls and cover of the brooder are made of cloth. Essentially the brooder is a cloth box containing a hover

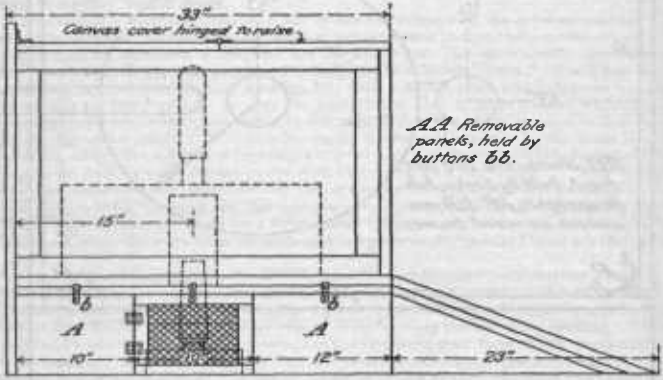

FIG. 2.—End elevation of brooder. Note sloping run to floor, hinged cover, removable side panel *AA* on base of brooder. In the center of this is a small door made of ½-inch mesh galvanized wire. Through this door the lamp is withdrawn for filling and cleaning. The panel *AA* is removed when the brooder is dismantled, and the whole superstructure is then packed away under the base.

of the type in which the lamp fumes are conducted outside of the building by an exhaust pipe.

These brooders are built permanently into the houses which they occupy. Two brooders are placed in each colony house, one in each of the back corners of the building. In this way one end wall and the back wall of the building form two of the sides of each brooder. The remaining side and cover are made of cloth tacked on light wooden frames as shown in the working drawings.

The floor of the brooder stands 10 inches above the floor of the house. From the front of the brooder a sloping walk extends down to the house floor, reaching in width clear across the whole front of the brooder. The cloth front and side of the brooder are not permanently fixed in position but are removable panels, which are held together and to the frame work by hooks and eyes (see fig. 1). The cover is hinged in the middle in such a way that it can be either half opened or entirely opened and folded back out of the way. In consequence of this arrangement it is possible to regulate with great nicety the amount of air which shall be admitted to the brooder.

Either the front or the side panel may be tilted out as much as desired at the base, thus admitting air there. Furthermore, by partly opening a panel and the cover it is possible to insure that there shall be a circulation of air through the brooder at all times.

A modification of a common make of hover is used, in which the lamp is placed inside the house directly under the brooder instead of in a box outside the house.

The reason for this modification is that in this climate, where one is likely to have bad weather during the early part of the hatching and rearing season, with heavy winds, snow, and rain, it is much easier and more satisfactory to take care of the lamp inside the house than from a small box outside the house. Another modification is that in the covers which are installed in these brooders an especially heavy insulation is put on top of the drum to reduce the loss of heat by radiation in extremely cold weather early in the spring.

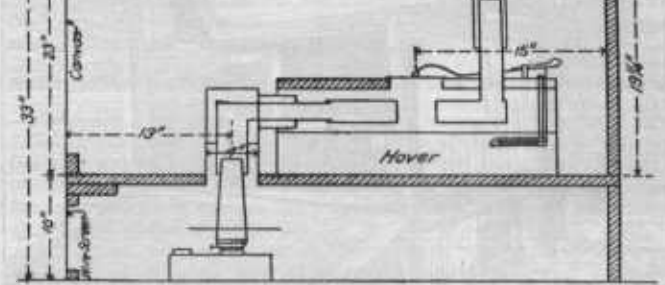

FIG. 3.—Section through middle of brooder. Note cloth cover and side, large space between floor of brooder and floor of house, in which the lamp is placed while the brooder is in operation, and which serves as a storage place for the whole upper part of the brooder when the latter is not in use.

One of the essential points about the brooder is its compactness in storage and the fact that all the parts may be stored in the base of the brooder itself. In this way the labor expense of carrying back and forth parts from a storage house each year is avoided. To bring about this result the size of the base is so calculated that all the parts of the brooder may be inclosed in it. The way in which this is done is apparent from an examination of figure 2. It will be seen that the end of the brooder base (marked *AA* in the diagram) is removable, being held in place by buttons *bb*. When the end of the brooding season is reached and there is no further use for the brooder that year, the side and front end panel of the brooder are removed, the canvas cover folded back and tacked to the wall of the building, and the hover dismantled. All of the parts are then shoved under the brooder floor and the panel *AA* put back in place again. The floor of the brooder is removable, so that it and the floor underneath may be cleaned and disinfected. By removing the legs the hover may be stored in the brooder base along with the other parts, or if one does not desire to do this the hover may be sus-

pended close up to the roof of the building. In that position it will be impossible for the birds to roost on it. Of course, all removable parts should be taken from the hover before it is hung up in this way. These parts may be stored in the brooder base. After the chickens are out of the house in the fall the parts of the brooder are taken out, thoroughly cleaned and disinfected, and then the whole is reassembled and made ready for the hatching season of the next year.

Detailed working drawings of the brooder are given herewith. Figure 2 shows the end elevation of the brooder; figure 3 shows a section through the middle of the brooder; figure 1 shows a floor plan; figure 4 shows the brooder in operation. * * * All dimensions are given on these drawings and from them it should be possible for anyone to construct the brooder for himself.

As material, any sort of planed lumber may be used. Probably pine will be found satisfactory and economical in most cases. Spruce or hemlock may be used to build the

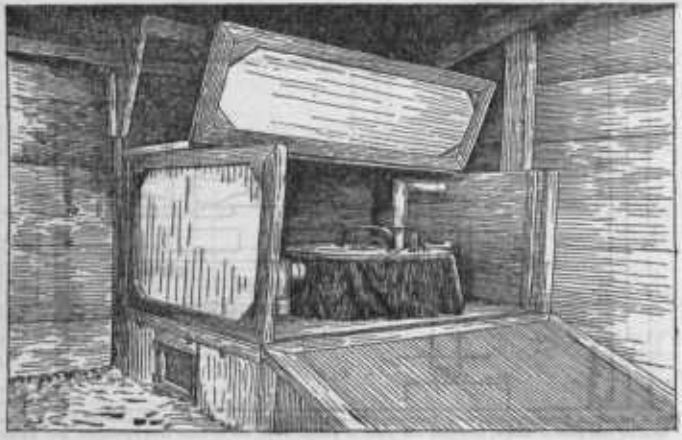

FIG. 4.—Brooder installed and ready for operation.

base, if one desires. For the cover and removable sides almost any sort of cloth may be used. Here we have employed the lightest weight canvas (duck) that could be obtained locally. Burlap may be used, or even unbleached cotton cloth in localities where the outside temperature is not too low.

ROOSTING CLOSET FOR POULTRY.[1]

In the curtain-front type of poultry house used at the Maine Experiment Station a feature of the original plan on which considerable stress was laid was the canvas curtain in front of the roosts.[2]

This curtain, together with the back wall of the house and the droppings board under the roosts formed a closet in which the birds were shut up at night during cold weather.

[1] Compiled from Maine Sta. Bul. 193. [2] U. S. Dept. Agr., Farmers' Buls. 227, p. 28; 357, p. 21.

When the curtain-front house was first devised it was thought essential to provide such a closet to conserve the body heat of the birds during the cold nights when the temperature might go well below zero. Experience has shown, however, that this was a mistake. Actual test shows that the roosting closet is of no advantage, even in such a severe climate as that of Orono. On the contrary, the birds certainly thrive better without the roost curtain than with it. It has been a general observation among users of the curtain-front type of house that when the roost curtains are used the birds are particularly susceptible to colds. It is not hard to understand why this should be so. The air in a roosting closet when it is opened in the morning is plainly bad. The fact that it is warm in no way offsets physiologically the evils of its lack of oxygen and excess of carbon dioxid, ammoniacal vapors, and other exhalations from the bodies of the birds.

For some time past it has been felt that the roosting closet was at least unnecessary, if not in fact a positive evil. Consequently the time of beginning to close the roost curtain in the fall has been each year longer delayed. Finally, in the fall of 1910, it was decided not to use these curtains at all during the winter. Consequently they were taken out of the house, or spiked to the roof, as the case might be. The winter of 1910–11 was a severe one. On several occasions the temperature dropped to 30° below zero. Yet during this winter the mortality was exceptionally low and the egg production exceptionally high.

In view of this experience the station has decided to discontinue the use of the roost curtain. It would seem to be generally undesirable or at least unnecessary.

EXHIBITION CONTESTS FOR IMPROVING DAIRY PRODUCTS.[1]

Exhibitions of dairy products for prizes have proved to be of great value to dairymen wherever tried. That much interest is being manifested is shown by the large number of entries from many States at recent exhibitions. At the International Dairy Show at Milwaukee, for example, there were entered 115 samples of milk and cream from all sections of the country.

A. C. Baer, of the Wisconsin Experiment Station, in commenting upon the educational value of these exhibitions states: "These contests have proved that milk and cream produced and handled under sanitary conditions and kept at a low temperature can be shipped thousands of miles and remain sweet for weeks. The contests have also helped to point out to the dairyman the common defects in milk and cream, and have suggested remedies to overcome the difficulties."

Mr. Baer also emphasizes the need of more local contests.

A friendly, neighborly milk and cream contest can be held annually in every city of the country. A contest of this kind brings the milkmen and dairymen together with common interests, and the educational value resulting will be no small gain to a community. The experience of men who have conducted these milk and cream contests has demonstrated the fact that milk or cream can be scored with reasonable accuracy for flavor and odor, bacteria, chemical composition, and keeping quality.

[1] Compiled from California Sta. Circs. 48, 60; Pennsylvania Sta. Bul. 93; Hoard's Dairyman, 42 (1911), No. 47, pp. 1449, 1460; Pract. Dairyman, 5 (1912), No. 21, p. 329.

Below is given a copy of the score card which has been used with success:

SCORE CARD FOR MILK.

Class..... Exhibit No.....

Item.	Perfect score.	Score allowed.	Remarks.
Bacteria	35		Bacteria found per cubic centimeter..
Flavor and odor	25		Flavor
			Odor
Visible dirt	10		
Fat	10		Per cent found
Solids not fat	10		Per cent found
Acidity	5		Per cent found
Bottle and cap	5		Bottle
			Cap
Total	100		

Another important phase of the work has taken the form of butter-scoring contests such as have been conducted by the dairy divisions of the Pennsylvania and California stations. These contests are conducted somewhat as follows: Each contestant at specified times ships an entry of butter and a record of methods used to the dairy division, the method blanks for this purpose being provided by the station. The butter upon arrival is numbered and any marks of identification are removed so that when scored no partiality can possibly be shown. The scoring is done under direction of some expert. After the butter is scored a letter is sent to each contestant giving the score and criticism by the judge, together with suggestions as to methods of improving the butter. The score card used at both the California and Pennsylvania stations was that of the National and State Associations with such explanations as were necessary. The following is a copy of the score card used by the University of California:

BUTTER SCORE CARD.

Name .....

No..... Date.....

Perfect.	Score.	Check.
45	Flavor	Rancid Overripe cream Bitter cream
25	Body	Worked too much Worked not enough
15	Color	Too high Too light Mottled Streaked
10	Salt	Too much Not enough
5	Packing	Poor packing Poor package
100	Total	

Scored by.....

Per cent of moisture.....

Per cent of salt.....

The butter that scored highest (96 per cent) was made as follows:

A fair grade of gathered cream testing 30 per cent was pasteurized at 180°, cooled to 48°, and 14 per cent of good commercial starter added. The cream was not ripened, as it contained 0.52 per cent acidity. It was held 2 hours at 48°, and churned. Time of churning was 40 minutes, and the granules were the size of wheat. The buttermilk had a temperature of 53°, and tested 0.02 per cent. The manner of washing was spraying at 50° until the water ran clear from the churn, then adding as much water at 50° as there was buttermilk. There was one working.

In making the butter that scored lowest (89 per cent) in the same entry the "cream in fair condition, age 2 days, testing 37 per cent, was ripened for 5 hours to an acidity of 0.55 per cent. Twenty-three per cent of starter was used. When churned it had a temperature of 51°, and the buttermilk was 53°. There were two washings at 54°, and one working."

With another sample of butter which scored 95½ per cent the "graded cream one day old was ripened at 62° to 0.42 per cent acidity by the aid of 18 per cent of starter. It was then cooled to 54° and churned immediately. The buttermilk and wash water were 56° and 58°. Standard culture, and approved equipment were used."

In discussing the general conditions as to flavor, body, and color of the butter as brought out in these scoring contests at the California station, Prof. Davis states that—

Fully 90 per cent of the unfavorable criticisms on flavor are due to conditions of handling, over which the buttermaker has no control. Unclean, cowy, barny flavors are the result of dirty methods. Stale, overripe, and sour are terms used to designate the flavors which are the result of too long holding of cream. Rancid flavor is a serious defect resulting from extensive decomposition, whereby the nonvolatile fats are acted upon by bacteria, become volatile and escape. Cheesy flavor is the result of a fermentation, but this time it is the proteid materials—casein in cream, curd in butter—which are acted upon. It is an injustice to the consuming public that such cream be manufactured into butter.

As a contrast to the large number of defects in flavor, for which the buttermaker is not responsible, are the small number of criticisms under flavor, due to methods of manufacture. They include fishy flavor, oily flavor, and metallic flavor. The two former may be closely associated, although oily flavor is perhaps the result of too high ripening, churning, and working temperatures. Fishy flavor is generally recognized by authorities on the subject to be the result of overworking butter which is made from high acid cream. The remedy for these defects is obvious. Metallic flavor is probably due to the pasteurization of a rich cream. It is likely to occur when cream which tests much over 35 per cent is pasteurized. Metallic flavor may also be due to holding milk or cream in rusty containers.

Next in importance to flavor is body. Body refers to the firmness or substance of the butter. On the San Francisco Dairy Exchange, the body of butter classed as extras must be "firm and solid, with perfect grain or texture, free from salviness." Under this head is also included texture, or grain, which refers to the appearance rather than to the firmness or substance. Perfect texture shows a grain which may be spoken of as having a flinty appearance when a trier full is broken. Body and texture influence the brine, both as to appearance and amount.

Weak or greasy body is due to high temperatures and overworking, whereby the fat is made to become soft, and grain is destroyed. Cooling the butter fat quickly after churning and working at a low temperature tends to produce a brittle, or crumbly body. Milky brine is due to lack of thorough washing. Leaky butter is caused by a lack of thorough incorporation of wash water, through washing in a fine granular form with cold water, then working insufficiently. Leaky butter is objectionable to consumers because of appearance. The presence of this free moisture, however, is no indication of a high moisture content. Dry body is caused by excessive churning, or high churning temperatures.

The importance of proper temperatures and manipulations is apparent. These can be determined only by a careful study of local conditions, with regard to season and the feed which the cows receive. In the spring when pastures are opened, the percentage of soft fats is usually increased, necessitating lower temperatures than at periods of the year when the butter fat is harder as a result of dry feed. The number of revolutions for working varies with the make of churn. The only general rule to follow is to work sufficiently to dissolve salt, prevent mottles, and leave butter with good texture.

The most serious defects under color are mottles, wavy or streaked. They refer to a difference or unevenness of color, and appear in butter as irregular, lighter, and darker portions, and often as spots.

The general opinion regarding these defects seems to be that they are the result of uneven salting. This is in part the cause, but another factor enters, and that is the presence of buttermilk or casein compounds. Salt as put into butter should be dissolved by the water present, and a brine solution result. If butter contains casein compounds, left in by failure to remove all the buttermilk, they are acted upon and hardened by this brine solution. Consequently, when the butter is worked streaks and spots result. Where these streaks and spots occur the lighter portions are due to the presence of casein compounds. The yellow and clear portions are free from these, and the fat is surrounded by clear brine. Well-washed butter very seldom shows mottles, unless the salting is done unevenly.

Mottled or streaky butter, then, may be prevented by churning at a low temperature to keep the butter in fine granules, washing thoroughly, and working sufficiently to insure equal distribution of salt. Even under these conditions a certain amount of buttermilk will be retained within the granules, but not sufficient to cause these defects.

Mottles or streaks do not necessarily detract from the palatability and wholesomeness of butter, but the fact that present-day markets are governed, to a great extent, by appearances makes it the more important that every buttermaker guard against them.

At a recent cheese scoring exhibition at the College of Agriculture of the University of Wisconsin an average of 89.57 per cent was placed upon 7 entries of cheese.

The main defect was an unclean, sour flavor and a moist, weak, short texture. Some cheeses were not firmed sufficiently before heating, others lacked the proper cook, and some were dipped too soon. The cheese that received the highest score was worked 30 minutes before heating and cooked to 114°. Sixty-five minutes elapsed from cutting to dipping and the water content of this cheese was 38.5 per cent. At this season of the year the proportion of fat to casein in milk is higher. This gives a tendency to make a soft, slushy curd and a weak boiled cheese. This can be overcome to a certain extent by salting more heavily.

BLIND STAGGERS OF HORSES.[1]

In a bulletin of the Kansas station, T. P. Haslam gives a brief summary of investigations of the disease of horses variously known as staggers, blind staggers, sleepy staggers, and mad staggers. This disease has occurred in outbreaks of greater or less severity in many sections of the United States, Kansas, Texas, Louisiana, North Carolina, Delaware, and Arkansas having apparently experienced the most trouble. According to N. S. Mayo, of the Virginia station, losses from this disease are also at times large in Virginia.

The first symptoms of the disease as described by Mayo [2] are usually a refusal of food and a desire for water, often accompanied by some difficulty in swallowing.

> Following this there is dullness and dropping of the ears, partial or complete blindness, loss of consciousness, delirium, and death; or in a few cases, recovery. Some cases become violent, running over obstacles, through fences, or destroying stalls in a frenzy of excitement. Animals suffering from this form ("mad staggers") are irresponsible and must be approached with caution. If the animal does not die in this stage of the disease, it usually becomes quiet or stupid ("sleepy staggers"), leans against the side of the stall or manger, or pushes its head against a wall, often standing with the legs braced. Sometimes animals in the stupid state of the disease are thrown into a frenzy by the least excitement or irritation. Animals suffering from this disease, if they can be induced to move, generally go in a circle, either to the right or left, depending on which side of the brain is most seriously diseased * * * [The] disease is not contagious and attacks no animals except horses, mules, and asses.

A severe outbreak of the disease in Kansas was investigated by Mayo at the Kansas station in 1891 with a view of ascertaining the cause of the disease. The conclusion was reached that it was due to mold which had badly damaged the small crop of corn grown that year because of dry weather. In 1902 and 1906 there were severe outbreaks in various parts of the State. There has also seemed to be a continual loss of horses from staggers in any locality in which much corn of an inferior grade is fed.

In investigations made during the outbreak in 1906 Haslam found that "in some localities cases which were reported as staggers were in reality typical cases of parasitism produced in horses by the palisade worm (*Sclerostoma equinum*, or *Strongylus armatus*) in the intestines and blood vessels, the error arising from the similarity of some of the symptoms of the two diseases. Those familiar with the course of either disease rarely make this mistake."

It is stated that there are few authentic records of cases occurring in Kansas with horses which had not been fed on corn, although in other States severe losses of horses have occurred when the grass in the pastures became moldy.

From a practical point of view, the relation between corn and staggers has been quite thoroughly demonstrated. The question naturally arises, which of the micro-

[1] Compiled from Kansas Sta. Bul. 173.

[2] Southern Planter, 73 (1912), No. 2, p. 163.

organisms present on the corn is the specific cause of the trouble, or whether a too exclusive corn diet or the immature corn possesses the injurious properties. These questions must still remain open, but the indications are that the cause of the trouble is contained in the moldy portions, as sound corn from the same bin was fed to more than a dozen horses and mules for months without producing any disorder. * * *

Dr. Carlo Ceni, of Italy, and his pupils report that the molds are capable of producing poisons, but only at certain seasons of the year, and that in the winter as well as in the middle of the summer they are entirely inactive. Another fact of great interest has been developed by Dr. M. Otto, of Germany, that while the extracts of two species [molds] obtained from Italy are very marked poisons, those from the same kind of molds growing in Germany possess little or no poisonous properties. The influence of the time of the year and the locality in which the molds grew may perhaps explain why loss of stock does not always follow the use of moldy feed and why pellagra has not always been found in corn-growing districts.

Veterinarians accustomed to treating this trouble usually cure a small majority of the cases treated if the treatment is begun before the disease has progressed very far * * * [but] it is very evident that the best means of combating this disorder consists in prevention. No unsound corn should be fed to horses. If it is necessary to feed a poor grade of corn it should be shelled and thoroughly cleaned with a fanning mill. Very good results have been obtained by the so-called floating of corn before feeding, which consists in pouring it into water. The moldy grains, being lighter, rise to the surface and may be skimmed off. Good results are reported by some who have ground the well-cleaned corn and mixed it with equal parts of bran and oats.

As Mayo points out, no moldy, wormy, or decomposing corn or other food should be fed. "Corn that has been attacked by the green corn worm at the tip and that is moldy is especially dangerous."

ADOBE AS A BUILDING MATERIAL.[1]

In a bulletin of the Colorado station, J. W. Adams calls attention of settlers in the drier regions where building materials are scarce or costly to the advantages of adobe buildings. He says:

An adobe house, properly built, will cost no more than a sod house, and yet be as permanent, attractive, and comfortable as it is possible to build a house. They do not settle after they are dry. Mice do not work in them if they are protected at the foundation. They are superior to concrete or cement block houses in that they are nonconductors of heat and cold. They never sweat or become frosty on the inside, and rain does not wet the walls through as it does in many concrete houses. The labor required to build an adobe house is no more than that required to build a similar house of sod or concrete. * * *

In planning a building of this kind, we should consider the kind of roof to be used and make the dimensions such that it may be covered with the least possible waste of material. The dimensions being decided upon, stake out the foundation carefully. If concrete foundation is to be used it will be necessary to make forms for the foundation. Then set good straight posts in each corner and at intervals of 14 or 16 feet on the inside of the wall. Line and plumb these posts very carefully. If desirable, short stakes may be used instead of posts until the walls get above the stakes, then these may be replaced by posts as high as the walls are to be. Good, straight 2 by 4 posts are all right. The stakes being lined and plumbed carefully, you are ready to begin the wall.

[1] Compiled from Colorado Sta. Bul. 174.

Now take your sod plow, select a patch of prairie where the grass is thick and tall—if possible (avoid sandy soil), and plow a thin sod. You may plow enough at one time for the entire building, if desired. Select a place for mixing the adobe near your water supply, if possible. With small buildings, it may be desirable to mix the adobe in the center of the building, but it will not pay unless your building is so located that you can not drive around it. Haul your sod and spread it in a circle not to exceed 12 to 14 feet in diameter. Make the pile about 8 inches deep. Now, throw the water on this pile until you think you have enough to wet the whole pile thoroughly. Then get on a horse and lead one or two others, and make the horses tramp around and around, turning very short. If they are allowed to go in a larger circle they will avoid stepping on the higher places. After you have tramped a few rounds you will discover dry places in the pile. Throw more water on these places and continue tramping and throwing on water until the whole mass is mucky. The pile will have a tendency to spread out, and some places will be sloppy while others are not wet enough. Then lead your horses out and take a manure fork (a six-tined fork is best) and throw the outer edges of the mass toward the center, taking care to throw the drier parts to the wet places and vice versa. Tramp again, adding water if needed. It is usually best to throw the edges in the second time in order to get the mass evenly mucked.

If you have been unable to get sod with plenty of grass and roots to form a fiber in the mud, you should add a small amount of straw, hay, or trash of some kind. Spread it over the mass after it is mixed, as above described, and tramp again until the straw is all tramped into the mud. When the mass is thoroughly wet and thoroughly mucked, and of such a consistency that it can be handled with a manure fork, it is ready to be put into the wall. Throw this on a wagon or sled, discarding any chunks that may not have been mucked, draw it alongside the wall and place it in the wall with a fork. Drop it into the wall with sufficient force to make it settle together solid, leaving no holes or spaces. Make as thick a layer as you can without its spreading out too wide. Let it spread over the edge of the wall an inch or two on each side. Be sure that the mud comes out to the edge of the wall at all places, otherwise there will be holes, or flaws, in the wall when trimmed. As soon as you have made one layer around the wall, if the weather is hot and dry you may be able to start around again placing a layer on top of the first, being careful to make the mud fit down on the first clear out to the edge of the wall to prevent flaws. When you have a layer about 12 inches thick, let it stand until it is firm, but not dry. Select a board with straight edges, 14 to 16 feet long, and as wide as the thickness of the wall. If the wall is to be more than 12 inches thick, two boards of the proper width may be cleated together to make the required width. Lay the board on top of the wall with one edge against the posts, get upon the board and trim straight down each edge of the board with a hay knife (see fig. 5). When the walls are trimmed all around in this manner they are ready for another layer of mud. Continue until the walls are the desired height. Never allow a layer to become hard before it is trimmed, or you will have a hard job.

The rapidity with which this work may be pushed depends upon the weather. If the weather is hot and dry, you may be able to make an average of 6 inches per day from start to finish. Some days you may put a foot and then let it rest a day or two. If the weather is cool or damp, the work will go correspondingly slower. In early spring or late fall the work is very slow, and one should not attempt to build adobe in winter.

Keep watch of your walls. If they are not drying rapidly, you had better lay off a day and allow the walls to dry. It is a very good plan to build 2 or 3 feet and then let it stand a week or so and then build 2 or 3 feet more, and so on until the wall is done.

The frames for doors and windows may be put in place and the mud built to them. But a better way is to trim the openings for doors and windows and fit frames into

the openings as soon as the walls are as high as the frames are to be. These frames should be of 2-inch stuff. The top of the frame should be as wide as the thickness of the wall and should extend into the wall a little. When the frames are in place you may build over them with the adobe. The walls will shrink in drying and draw away from the frames a little, leaving a crack. These cracks may be plastered up with a trowel.

If the roof is to be of shingles or iron it will be necessary to anchor the plates to the wall to prevent the roof blowing off. This may be done by putting 14-inch bolts through short pieces of 2 by 4 and planting them in the walls as you build so the top of the bolt will just reach through the plate. If adobe or sod roof is to be used

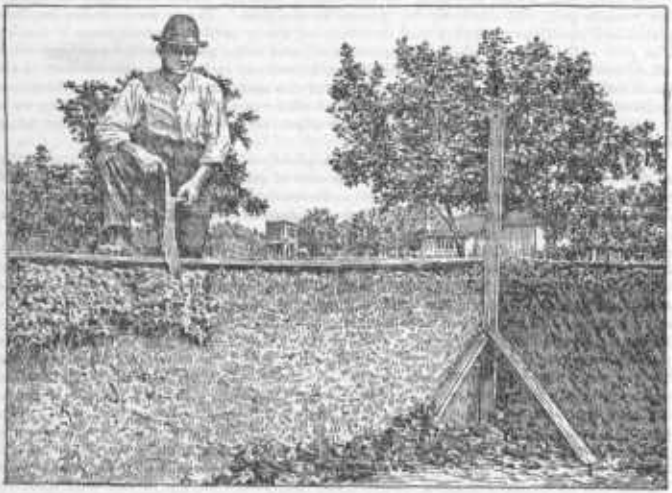

FIG. 5.—Trimming edge of adobe wall with hay knife.

the weight will be sufficient to prevent blowing off. The roof should be leak-proof to prevent water running down the walls and softening them.

Summarizing these directions for adobe construction, Mr. Adams emphasizes especially the following points:

"(1) Line [the] posts and plumb them carefully, and [the] walls are bound to be straight and plumb. (2) Be sure to make good joints between layers. (3) Never allow adobe to get hard before trimming. (4) Never allow dry or untramped chunks of sod to enter the wall. (5) Never allow water to settle against the walls."

An attractive as well as durable building may be secured by covering the outer walls with cement plaster and blocking off.

WHITE AND COLOR WASHES.[1]

There is no cheaper or more attractive means of improving the appearance and sanitary condition of the farmhouse and surroundings than the judicious use of white or colored washes. Such washes are easily prepared and applied. A recent Farmers' Bulletin of this department [2] gives directions for preparing standard whitewashes. A few formulas for washes not included in that bulletin and which have also proved satisfactory in use are given below:

According to the Alabama Tuskegee Experiment Station a unique and valuable use can be made of the white and colored clays which abound in many localities, viz, the preparation of washes for covering or kalsomining the exterior and interior of dwellings, schoolhouses, etc.

Where a clay is sand free all that is necessary is to mix it thoroughly with hot or cold water in order to obtain a consistency of the average good whitewash and to apply it to the rough surface in the usual manner. Where dressed lumber and hard-finished plastering are to be kalsomined the surface must be previously prepared and sized.

Sandy clay can also be used, but it must first be freed from sand by one of the following methods:

(*a*) Sift the pulverized clay through a fine sieve or a piece of coarse cloth. (*b*) Stir the pulverized clay thoroughly into a vessel partly filled with water; let stand 2 minutes. The sand and gravel will sink to the bottom, and the water, with its suspended clay particles, can be poured off. (*c*) Take a coarse bag, something like a flour sack; put half a gallon or so of the pulverized clay into it; dip this repeatedly into a vessel of water until the clay has been washed out. The sand in the bag may be thrown away, and a fresh batch taken and treated in the same way until a sufficient quantity to suit your purpose has been gotten out.

Where a wash is desired which does not easily rub off, one of the following methods is proposed:

(*a*) For every gallon of color wash stir in a pint of glue size (glue that has been dissolved in water until it becomes the consistency of mucilage). (*b*) To every gallon of color wash stir in a pint of well-boiled starch or flour paste, being sure that there are no lumps in it. (*c*) For every gallon of color wash stir in a quart of thoroughly boiled sweet milk from which all the cream has been taken. (*d*) Boil a pound of rice in 2 gallons of water until a smooth paste is formed; strain through a cloth, and use the water the same as any other sizing.

The colors of the above clays may be blended by mixing one with the other, thus producing a variety of shades, or coloring matters like laundry blue (Prussian blue) may be introduced at very little extra expense.

An Australian whitewash, which it is claimed will not rub off, is prepared by "dissolving 2 pounds of ordinary glue in 7 pints of

[1] Compiled from Alabama College Sta. Bul. 136; Alabama Tuskegee Sta. Bul. 21; Daily Cons. and Trade Rpts. [U. S.], 14 (1911), No. 215, p. 1209; Queensland Agr. Jour., 17 (1906), No. 2, p. 89.

[2] U. S. Dept. Agr., Farmers' Bul. 474.

water, and when all is dissolved adding 6 ounces of bichromate of potassium dissolved in a pint of hot water. Stir the mixture up well, and then add sufficient whiting to make it up to the usual consistency, and apply with a brush in the ordinary manner as quickly as possible. This dries in a very short time, and, by the action of light, becomes converted into a perfectly insoluble waterproof substance, which does not wash off even with hot water, and at the same time does not give rise to mold growth, as whitewash made up with size often does. It may be colored to any desired shade by the use of a trace of anilin dye or powdered coloring, while by the addition of a small proportion of calcic sulphite its antiseptic power is much increased."

A recent consular report states that a traveler in the rural districts of Uruguay will be struck by the fine white color of the farm buildings even during the wet season. This neat effect is secured by the use of a whitewash prepared by macerating the sliced leaves of the common cactus in water for 24 hours, producing a liquid of creamy consistency, to which lime is added and the whole well mixed. "When applied to any surface, be it of wood, brick, iron, or other material, a beautiful pearly white appearance is produced, which will endure through storms and frosts for many years." It is suggested that in sections of the United States where the cactus is abundant it might be utilized with advantage in this manner.

These whitewashes, like all those which contain milk, flour, glue, or other organic matter, are not recommended for use in damp interior places.